

10,181; Pike's Peak, 13,658; Sandy Hook, 11,302; Sandusky, 10,484. The smallest movements have been, as follows: Augusta, 2,734 miles; Boise City, 1,942; Knoxville, 2,346; Lynchburg, 2,065; Nashville, 1,971; Visalia, 1,833.

*Highest Velocities*, in miles per hour, have been as follows: Barnegat, E., 60, 21st; Cape Henry, NW., 58, 4th; Cape Lookout, SE., 54, 4th; Cape May, NW., 68, 4th; Dodge City, NE., 60, 3rd; Fort Gibson, S., 50, 14th; Fort Whipple, SE., 60, 4th; Indianola, NE., 96, 16th; Mt. Washington, NW., 102, 23rd; North Platte, SE., 60, 2nd; Pike's Peak, W., 65, 26th; Philadelphia, SE., 60, 4th; St. Marks, SE., 63, 3rd; Washington, NW., 55, 4th.

*Local Storms, Tornadoes, &c.*, as distinct from extended storms, have been reported as follows: 3rd, Louisiana, Mo., severe storm of wind and rain. 7th, Mesquite, Texas, at 3 a. m., a local storm lasting nearly one hour, moving toward ESE., 12 miles wide; houses blown down. 13th, Mare Island, Cal., high wind and thunder-storm. 16th, whirlwind in the bay at Wood's Holl. 30th, Farmington, Utah, very high wind.

## VERIFICATIONS.

*Indications.*—The detailed comparison of the tri-daily weather indications, with the telegraphic reports for each succeeding twenty-four hours, shows a general percentage of omissions of 0.3 per cent., and of verifications of 84.6 per cent. The percentages of verifications for the four elements have been: weather, 91.2; wind direction, 82.4; temperature, 84.8; barometer, 80.1. The percentages of verifications by geographical districts have been: New England, 83.5; Middle Atlantic States, 88.7; South Atlantic States, 86.1; East Gulf States, 89.6; West Gulf States, 83.6; Lower Lake region, 80.8; Upper Lake region, 83.2; Tennessee and Ohio valley, 86.6; Upper Mississippi valley, 83.7; Lower Missouri valley, 80.3. Of the 3,708 predictions that were made, 121, or 3.3 per cent., are considered to have entirely failed; 89, or 2.4 per cent., were one-fourth verified; 555, or 15.0 per cent., were one-half verified; 378, or 10.3 per cent., were three-fourths verified; 2,565, or 69.0 per cent., were wholly verified.

*Cautionary Signals.*—During the past month 213 Cautionary Signals have been displayed at 47 stations on the coasts of the United States, of which 173, or 81.2 per cent., were reported verified within 100 miles of the station. Thirty-two cases of high winds were reported, from these stations, for which signals were displayed too late or not at all.

## NAVIGATION

*Stages of Water in Rivers.*—In the table on Chart No. III, are given the highest and lowest readings on the Signal Service river gauges. It will be seen that the rivers have all been quite low, and the Ohio so low as to impede navigation. The highest stages occurred after the 15th, and up to the close of the month. *Special reports* as follows: Roanoke river, North Carolina, very high on the 6th, 7th and 8th, within 3 feet 9½ inches of the great freshet of 1873. *Muscatine*, Iowa, 31st, river at low-water mark. *Pittsburgh*, river lowest for 30 years. *Keokuk*, river very low; navigation suspended above this point. *Omaha*, the channel of the Missouri has approached the Nebraska shore. *Shreveport*, the upper Red river and tributaries all very high.

## TEMPERATURE OF WATER.

*In General.*—The temperatures of water, as observed in rivers and harbors, are shown on the Chart No. III.

*Maximum and Minimum Temperatures.*—The highest maxima have been 84° at Galveston and Key West, 83° at Shreveport, 77° at Nashville and 76° at St. Marks and Cairo. The lowest minima have been 44° at Alpena, 45° at Cleveland, Duluth and La Crosse, and 46° at Eastport, Omaha and Yankton.

*Ranges of Temperature.*—The least ranges have been: 3° at Key West and San Francisco, 4° at Eastport and 5° at Charleston, Jacksonville, Wilmington and St. Paul. The largest have been 25° at Cleveland, 21° at La Crosse and 20° at Alpena, Galveston, Grand Haven, Omaha and St. Louis.

## ATMOSPHERIC ELECTRICITY.

*Thunder-storms* occurred as follows: On the 1st in Iowa, Mich., Mo., Vt., Wis., 2nd, Dakota, Iowa, Kan., Wis., 3rd, Ill., Iowa, Kan., Mich., Mo., Neb., Tex., Wis., 4th, Canada, Wis., 5th, Mass., 7th, Kan., Tex., 8th, Neb., 9th, Ill., Ind., Iowa, Ohio, Wis., 10th, Md., Va., 12th, Ill., Iowa, Neb., Col., Wash. Ty., 13th, Cal., Ill., Iowa, Kan., Mich., Neb., Wis., 14th, Iowa, Mich., Neb., Wis., 15th, Tex., Iowa, Kan., Neb., 16th, Tex., 18th, La., Canada, Ill., Tex., 20th, Ill., Ind., Ky., Md., N. C., Ohio, Pa., W. Va., Mo., Va., 21st, Del., Md., Mass., N. J., Va., Pa., 22nd, Conn., Mass., 24th, Tex., 25th, Iowa, Tex., 26th, Fla., Iowa, Neb., 27th, Iowa, 29th, Canada, Tex., Vt., 30th, La.

*Dist. mt lightning* was reported as follows: On the 1st in Ill., Iowa, Kan., Mich., Mo., N. H., N. Y., Ohio, Vt., Wis. 2nd, Iowa, Kan., Neb., N. Y., Vt., Fla., Tenn. 3rd, Iowa, Mich., Mo., Tex. 4th, Tex. 5th, Me. 6th, Ind., Kan., Tex. 7th, Tex. 8th, Dak., Iowa, Kan., Neb. 9th, Ind., Wis., Mo. 10th, Md., Pa., Va., Ga. 11th, N. C. 12th, Ill., Ind., Iowa, Kan., Neb. 13th, Ill., Ind., Iowa, Kan., Mich., Tex. 14th, Mich., Tex. 15th, Kan., Tex. 16th, Tex. 19th, Tex. 20th, Ky.; Md.; Pa. 21st, Md., N. J., Pa., Va., Ohio. 25th, Fla. 26th, Neb. 27th, Neb. 29th, Tex.; La. 30th, Tex. 31st, Fla.

*Auroras* were observed on the 1st in Minn.; 2nd, Ill.; 4th, Mich.; 11th, Conn., Ill., Iowa, Mass., N. J., Ind., Mich., Minn., Va., Me., Wis.; 12th, Me.; 15th, Iowa.; 16th, Me.; 18th, Dak.; 26th, Wis.; 27th, Me., N. H.; 30th, N. Y.; 31st, Wis.

## OPTICAL PHENOMENA.

*Solar halos* were observed on the 1st in Ill. 2nd, Ohio. 4th, Mo., R. I. 6th, Ky. 7th, N. Y. 8th, N. H., R. I. 11th, Neb. 12th, Mich., Ohio. 13th, Ohio, Ky. 14th, S. C. 15th, Iowa, N. Y. 16th, Ill., N. Y. 17th, Ind.; N. Y., Ohio, Ky. 18th, Ohio. 20th, Me. 21st, Iowa, Me. 23rd, Iowa, N. Y. 24th, Ill., Ind., Iowa, Mich., N. H., N. Y., Ky., R. I. 25th, Ind., N. Y., Ohio, R. I. 28th, Ill. 29th, Ill., Mich., Ohio. 30th, Ill., Ind., Ohio, Ky. 31st, R. I.

*Lunar halos* were observed as follows: On the 10th in Md. 12th, Va. 13th, Mo., N. J., Va., Ga., S. C. 14th, Ind.; Mo., Neb., N. Y., Va., Pa. 16th, Ill., Iowa, Kan., Va., Pa. 17th, Ill., Ind., Me., Neb., N. J., N. Y., N. C., Ohio, Pa., Va., Md., Ky. 18th, Mass., N. C., Pa., Tenn. 19th, N. J., N. Y., N. C., Pa., Va., Wis. 20th, Iowa, Va., S. C. 21st, Mich. 23rd, Ill., Iowa, Mo., Neb., Tex., Wis., Mich. 24th, Ind., Ky., Md., N. H., N. J., N. Y., Ohio, Pa., Tex., Va., Ga., S. C., W. Va. 25th, Kan., Ky., W. Va. 26th, Utah, Ky. 27th, Va. 29th, N. Y., Pa. 30th, Ind., Ohio. 31st, N. Y.

*Mirage* was observed on the 8th in Kan. 9th, S. C. 21st, Dak. 22nd, Kan. 29th, Dak. At New London, 14th to 18th, and 25th to 28th.

## MISCELLANEOUS PHENOMENA.

*Birds.*—*Blackbirds* were seen on 7th at Oregon, Mo.; 11th, last seen, Contoocookville, N. H.; flying S., 6th, Palermo, N. Y.; 3d, Wappinger's Falls, N. Y.; 10th, Jacksonburg, Ohio; flying W., on 21st, Austin, Tenn. *Blue jays* going south, 11th, Creswell, Kan.; first seen 21st, Belmont Farm, Texas. *Blue birds* and *Ground Sparrows* last seen on 31st, Contoocookville, N. H. *Blue-birds*, 27th, Palermo, N. Y.; 31st, flying S., Kensico, N. Y.; first seen, 22d, Belmont Farm, Texas. *Buffalo birds*, large flocks going S., 5th, Creswell, Kan. *Crows*, flying S.; 11th, 12th, Geana, Neb.; 26th, Palermo, N. Y. *Cranes*, flying S.; 29th, Baxter Springs, Kan.; 21st, Sedgwick, Kan.; 20th, Emerson, Neb.; 11th, Clear Creek, Neb.; 21st, Belmont Farm, Texas; flying S. W., 20th, Creswell, Kan. *Ducks*, flying N.; 12th, Lower Brule Agency; plentiful, 20th, Farmingdale, N. Y.; flying S., 29th, 30th, 31st, Daytona, Fla.; 2d, Frankford, Mo.; 29th, 31st, Belmont Farm, Texas; 22d, Morgantown, West Va.; numerous, 10th, Oregon, Mo. *Wild ducks* seen on 25th, New Bedford, Mass. *Eagles*, flying S., 5th, Sedgwick, Kan. *Geese*, flying S., daily, 3d to 31st, Lower Brule Agency; 31st, Milford, Del.; 21st, Hennepin, Ill.; 29th, Louisville, Ill.; 2d, Elmira, Ill.; 8th, 20th, Milford, Ind.; 31st, Laconia, Ind.; 1st, 20th, Afton, Iowa; 10th, Guttenburg, Iowa; 26th, Cresco, Iowa; 10th, Nora Springs, Iowa; 22d, Tabor, Iowa; 1st, Boonsboro, Iowa; 29th, Baxter Springs, Kan.; 2d, 17th, 19th, 24th, 26th, 28th, 29th, Creswell, Kan.; 18th, 19th, Sedgwick, Kan.; 17th, Independence, Kan.; 26th, Lawrence, Mass.; 23d and 24th, Detroit, Mich.; 22d, Northport, Mich.; 2d, Frankford, Mo.; 20th, Emerson, Neb.; 1st, Plattsmouth, Neb.; 5th, 24th, 28th, 29th, and 31st, and very numerous at Clear Creek, Neb.; 24th, Contoocookville, N. H.; 29th, Oregon, Mo.; 21st, Freehold, N. J.; 27th, Ardemia, N. Y.; 13th, Palermo, N. Y.; 23d, Penn Yan, N. Y.; 21st, 26th, Farmingdale, N. Y.; 26th, Wappinger's Falls, N. Y.; 11th, Bellefontaine, Ohio; 29th, Westchester, Pa.; 22d, Tioga, Pa.; 13th, Franklin, Pa.; 24th, Halmesville, Pa.; 21st and 26th, Austin, Tenn.; 1st, 28th, 31st, Belmont Farm, and numerous 21st, 22d; 27th, Embarrass, Wis.; 21st, 29th, Corsicana, Texas; 10th, Breckenridge, Minn.; 22d, Leavenworth, Kan.; 23d, Vicksburg, Miss.; 29th, Cincinnati, Ohio; 20th, Morgantown, West Va.; flying S. W., 24th, Laconia, Ind.; flying W., 23d, Northport, Mich.; flying W. S. W., 19th, and N. W., 18th, North Volney, N. Y.; numerous 25th, Olivet, Dakota; flying N., 22d, 23d, Waterburg, N. Y.; 3d, Corsicana, Texas; flying N. W., 11th, Montana, Wis.; flying S. E., 2d, Green Castle, Pa.; flying S. S. W., 20th, and S. E. 21st, at Alto Vista, Va. *Humming birds*, last seen on 1st and 3d, Oregon, Mo. *Pelicans*, flying S., 27th, Oregon, Mo. *Robins*, last seen 16th, Creswell, Kan.; 24th, Contoocookville, N. H.; 18th, Palermo, N. Y.; 24th, Penn Yan, N. Y.; departing 7th at West Charlotte, Vt. and entirely disappeared, together with picebes and sparrows, after the 24th. *Swallows*, last seen 13th, Wappinger's Falls, N. Y. *Chimney swallows*, leave Jacksonburg, Ohio, 14th. *Snow-birds*, first seen 20th, Bellefontaine, Ohio; 24th, Bethel, Ohio; 24th, Jacksonburg, Ohio; 25th, Ringgold, Ohio.

*INSECTS.*—*Bees* and *butterflies*, flying about, 23rd, Louisville, Ill.; first seen, 21st, Belmont Farm, Tex.,